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## Monitoring techniques and alarm procedures for CMS services and sites in WLCG

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The CMS offline computing system is composed of more than 50 sites and a number of central services to distribute, process and analyze data worldwide. A high level of stability and reliability is required from the underlying infrastructure and services, partially covered by local or automated monitoring and alarming systems such as Lemon and SLS; the former collects metrics from sensors installed on computing nodes and triggers alarms when values are out of range, the latter measures the quality of service and warns managers when service is affected. CMS has established computing shift procedures with personnel operating worldwide from remote Computing Centers, under the supervision of the Computing Run Coordinator on duty at CERN. This dedicated 24/7 computing shift personnel is contributing to detect and react timely on any unexpected error and hence ensure that CMS workflows are carried out efficiently and in a sustained manner. Synergy among all the involved actors is exploited to ensure the 24/7 monitoring, alarming and troubleshooting of the CMS computing sites and services. We review the deployment of the monitoring and alarming procedures, and report on the experience gained throughout the first 2 years of LHC operation. We describe the efficiency of the communication tools employed, the coherent monitoring framework, the pro-active alarming systems and the proficient troubleshooting procedures that helped the CMS Computing facilities and infrastructure to operate at high reliability levels.

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